Use of Serology to evaluate the impact of clinical salmonellosis in swine on the herd status and on the contamination of pig carcasses from affected herds.

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Abstract: Clinical episodes of salmonellosis, often associated with high levels of herd contamination and caused by serotypes other that Choleraesuis, are now observed in Canada. We were thus particularly interested, in this study, to examine the impact of clinical salmonellosis on the serological status of the affected herds and to determine if clinical salmonellosis can be related with an increased level of contamination of carcasses of animals from these herds, after the slaughter process. The Diakit was used as screening test for the detection of *Salmonella* antibodies in finishing pigs from affected (n=15) and non affected (n=15) herds. The percentage of animal serologically positive to *Salmonella* in herds that experienced clinical salmonellosis was significantly higher than in herds without clinical sign of salmonellosis (30.0% vs 11.1%, p=0.003). Furthermore, a higher level of contamination of carcasses by *Salmonella* was found in carcasses from animals from those herds (13,6% vs 2,9%, p=0.048) at slaughterhouse. Herds that were found infected by various serovars from serogroups B (Typhimurium, Derby, Agona, Brandenburg, Heidelberg), C (Ohio, Infantis, Manhattan) , E (Senftenberg, Anatum) and N (Urbana) were detected by the ELISA.

Keywords: serology, carcasses contamination, clinical salmonellosis

Introduction: The identification of herds positive to *Salmonella* is considered as an important step to ensure the appropriate management of infected herds at the slaughterhouse. Detection of highly contaminated herds by bacteriological and/or serological sampling is thus a critical step to avoid contamination of pork products. Recently, episodes of clinical salmonellosis, associated with *Salmonella* Typhimurium, one of the most prevalent serotype in human, were reported in swine herds in Canada (Letellier et al., 1999, Desrosiers, 1999), seldom at the end

of the fattening period. In infected herds, most of the animals are positive to *Salmonella* (Letellier et al., 1999). After the infection, most animals will developp detectable antibodies titers within few weeks (Neilsen et al., 1995). We developped an ELISA procedures that detect the four serogroups of *Salmonella* present in canadian herds (B,C,E and N) (Letellier et al., 2000). The aims of this study were to evaluate the impact of clinical salmonellosis on the contamination of carcasses from animals from theses herds and to determine if affected herds can be serologically detected at the abattoir.

Materials and Methods: The selection of positive herds (n=15) was done according to three criteria: a diagnosis of salmonellosis from an experienced veterinarian based on clinical signs of yellowish diarrhea accompanied by fever, prostration and/or mortality, *Salmonella* spp. isolation in pure culture from internal organs of affected animals and/or Salmonella spp. isolation from many animals from many pens with the exclusion of other enteric pathogens. Negative herds (n=15) had none of these criteria. Animal from herds that experienced clinical salmonellosis were kept in separated pens after shipping to abattoir and slaughtered at the end of the day. Blood samples were taken and analysed by the Diakit (cut-off of 40%) and bacteriology was done on feces and mesenteric lymph nodes. The 3 sites (mega-reg) method for sampling carcasses was performed on carcasses from the same lots the following day. A 1-g sample of cecal content was aseptically collected from each animal and 1-g samples of mesenteric lymph nodes (MLN) were also collected. For bacteriological culture, a primary enrichment of feces, MLN and carcasses samples was done in in Nutrient Broth (9 mL/18h at 37°C). Inoculation in selective enrichment in Tetrathionate Brilliant Green broth (9 mL/18h at 37°C) was followed by an inoculation on Brilliant Green Sulfa agar with novobicin (20 ug/mL, 24/48h at 37°C). Colonies with a biochemical pattern suggestive of *Salmonella* spp. were tested by slide agglutination. Salmonella isolates were serotyped at the Health Canada Laboratory in Guelph (Dr Ann Muckle).

Results: At slaughterhouse, bacteriology was found to be a weak indicator of the status of a herd. The fecal prevalence of *Salmonella* may reflect a very recent contamination by transport, selection or pens in abattoir. The serology provided a better indication of farm contamination level and herds with clinical signs of salmonellosis are were significantly more seropositive to *Salmonella*. Serology was a better indicator than bacteriology to predict contamination rates ofcarcasses by *Salmonella*.

Table 1: Salmonellosis in swine herds vs serology and bacteriology status of carcasses

Status of the herds animal	Serology % positive to *Salmonella*	Bacteriology % feces positive to *Salmonella*	Bacteriology % MLN positive to *Salmonella*	Bacteriology % carcasses positive to *Salmonella*
Clinical signs (n=187)	30.0%[a]	54.9%	13.2%	13.6% [b]
No clinical signs (n=117)	11.1% [a]	70.1%	23.3%	2.9% [b]

[a] p value = 0.003 and [b] p value < 0.05

Discussion: Presence of clinical salmonellosis was found in this study a significant risk factor that increase the risk of contamination by *Salmonella* of carcasses from animal from affected herds. Since the environment within these herds are highly contaminated, rigorous disinfection protocols should be applied to avoid contamination of following lots. The serology testing was found to be a useful test for the indirect monitoring of the presence of the various serovars of *Salmonella* present in Canada. It can be thus be used , at the slaugtherhouse level, to manage these lots in order to prevent the contamination during the evisceration of the animals from affected herds. Given that cross-reactivity with enterobacteria was not observed with the Diakit, in opposition to other available ELISA tests to detect *Salmonella* antibodies, we consider that this serological test may be used to detect herds that experienced clinical salmonellosis without possible cross-reactions with other intestinal pathogens such as *E. coli*.

References

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